Action Items

Company: KPC
Location: West desert - Egypt
Facility: OASR Compressor station
PHA Method: HAZOP
PHA Type: Initial

Process:

File Description:

Date:

Process Description:

Chemicals:

Purpose:

Scope:

Objectives:

Project Notes:

Filters: No Filter Applied

Action Items

Session: (1) 17/07/2013
Node: (1) Main compressors' suction header (OT: 57.2 °C; OP: 70 - 35.9 barg) Intention: Feed line to compressors
Drawings: 3538-200-KKD-12210
3538-200-KKD-12353
3538-200-KKD-12355
3538-200-KKD-12359
3538-200-KKD-12360
3538-200-KKD-12361
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
4. Misdirected Flow	4.2. Manual Valve in Methanol Injection left open due to misOperation	4.2.1. Back flow of process gas to methanol injection circuit , leading to increase of pressure of methanol injection circuit .	4.2.1.1. Check valve in methanol injection line 4.2.1.2. Methanol injection circuit has the same design pressure of suction gas line		1. Remove the Locked Open configuration on Methanol injection Isolation valves.	ENPPI

Session: (1) 17/07/2013
Node: (1) Main compressors' suction header (OT: 57.2 °C; OP: 70 - 35.9 barg) Intention: Feed line to compressors
Drawings: 3538-200-KKD-12210
3538-200-KKD-12353
3538-200-KKD-12355
3538-200-KKD-12359
3538-200-KKD-12360
3538-200-KKD-12361
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
6. Lower Temperature	6.3. Low ambient temperature.	6.3.1. Possible condensate / yydrates formation in the inlet line of BDV 010	6.3.1.1. The inlet line of BDV 010 is sloped to main suction line in order to drain the condensate . 6.3.1.2. Provision of mehtanol injection in the inlet line of BDV 010 .		2. Verify by a general evaluation document the possibility of hydrate formation in suction and discharge lines of all BDVs and PSVs installed in the high pressure sections of the unit, taking into account the project gas composition.	ENPPI

Action Items

Session: (2) 18/07/2013
Node: (2A) Compressor "A" suction including Compressor Suction Drum Train A QA-V-8001 A (OT: 57.2°C; OP: 35.9 barg)
Intention: Condensate separation
Drawings: 3538-200-KKD-12210
3538-200-KKD-12211
3538-200-KKD-12250
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
16. No/ Less Flow (gas)	16.3. Failure close of PV 123	16.3.1. ~~Same As 16.1.1, 16.1.2, 16.1.3~~	16.3.1.1. ~~Same As 16.1.1.1 & 16.1.2.1~~		3. Verify the possibility to configure PV123 as fail open.	ENPPI/SOLAR
	16.5. Temporary strainer blockage in the suction line of compressor QA-K-8001A	16.5.1. ~~Same As 16.1.1, 16.1.2 , 16.1.3, 16.4.2~~	16.5.1.1. ~~Same As 16.1.1.1, 16.1.2.1~~		4. Provide high alarm on PDIT 108 across temporary strainer	ENPPI

Session: (2) 18/07/2013
Node: (2A) Compressor "A" suction including Compressor Suction Drum Train A QA-V-8001 A (OT: 57.2°C; OP: 35.9 barg)
Intention: Condensate separation
Drawings: 3538-200-KKD-12210
3538-200-KKD-12211
3538-200-KKD-12250
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
25. Lower Temperature	25.1. Low ambient temperature.	25.1.3. Possible wax formation in the level instrument connections, leading to operating problems.	25.1.3.1. Availability of heat tracing for level instruments of all condensate drums.		5. Indicate the availability of the heat tracing for level instruments installed in condensate drum in all applicable P&IDs	ENPPI

Session: (2) 18/07/2013
Node: (2A) Compressor "A" suction including Compressor Suction Drum Train A QA-V-8001 A (OT: 57.2°C; OP: 35.9 barg)
Intention: Condensate separation
Drawings: 3538-200-KKD-12210
3538-200-KKD-12211
3538-200-KKD-12250
Parameter: Maintenance

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
32. Others Maintenance	32.1. Periodic gas sampling	32.1.1. The operator needs to reach the new sample connection located...			6. Check sample connection downstream QA-V-8001A to be located in accessble location for operator...	ENPPI

Action Items

Session: (2) 18/07/2013
Node: (2A) Compressor "A" suction including Compressor Suction Drum Train A QA-V-8001 A (OT: 57.2°C; OP: 35.9 barg)
Intention: Condensate separation
Drawings: 3538-200-KKD-12210
3538-200-KKD-12211
3538-200-KKD-12250
Parameter: Maintenance

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
32. Others Maintenance (cont.)	32.1. Periodic gas sampling (cont.)	...downstream QA-V-8001A (Gas Phase)			...during 3D model review .	
	32.3. Maintenance of LV 102	32.3.1. Needs to operate by-pass line of LV 102			7. Add a note in all applicable P&IDs that the level gauge of all condensate drums shall be visible from manual valve of by-pass line of relevant level control valve installed on liquid discharge line.	ENPPI

Action Items

Facility: QASR Compressor station

Session: (5) 24/07/2013
Node: (3A) Compressor Train A QA-K-8001 A (suction/ discharge OT: 174.5 °C; OP: 123.5 barg) and Compression Discharge Cooler QA-E-8001 A (inlet/ outlet OT: 174.5/58 °C; OP: 123 barg)
Intention: Compression and discharge cooling
Drawings: 3538-200-KKD-12212
3538-200-KKD-12213
3538-200-KKD-12214
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
35. No/ Less Flow	35.1. No Flow from QA-V-8001A (#02A)	35.1.1. Compressor QA-K-8001A Surge leading to possible mechanical damage.	35.1.1.1. Compressor QA-K-8001A equipped with anti-surge Control system,operating anti surge valve FV103 35.1.1.2. PI110 low low pressure interlock to stop compressor QA-K-8001A 35.1.1.3. Low pressure alarm on PI112 35.1.1.4. Low Flow alarm on FI102		8. SOLAR to provide dynamic simulation of the compressor circuit with indication of turn down values.	SOLAR
	35.3. Failure of speed controller reducing the speed	35.3.1. Increase of pressure in the existing facility.(suction)	35.3.1.1. Low speed alarm SIT-101		9. SOLAR to check the presence of low speed alarm on SIT-101	SOLAR
39. No/ Less Flow (vent seal)	39.1. Increase of back pressure flare header.	39.1.1. Possible damage of a dry gas seal.	39.1.1.1. PT-5167 to open AV-5167 to vent to safe location.		10. SOLAR to provide suitable dry gas seal for a maximum 6 barg back pressure from HP flare header and update the relevant documentation accordingly.	SOLAR

Action Items

Session: (5) 24/07/2013
Node: (3A) Compressor Train A QA-K-8001 A (suction/ discharge OT: 174.5 °C; OP: 123.5 barg) and Compression Discharge Cooler QA-E-8001 A (inlet/ outlet OT: 174.5/58 °C; OP: 123 barg)
Intention: Compression and discharge cooling
Drawings: 3538-200-KKD-12212
3538-200-KKD-12213
3538-200-KKD-12214
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
41. Lower Temperature	41.3. Depressurization of compressor train QA-K-8001A	41.3.1. Reduction of temperature due to gas depressurization leading to no significant consequences	41.3.1.1. The compressor train design temperature is equal to minimum temperature due to depressurization		11. SOLAR to confirm/highlight that compressor can handle a minimum temperature of -40° C	SOLAR

Session: (5) 24/07/2013
Node: (3A) Compressor Train A QA-K-8001 A (suction/ discharge OT: 174.5 °C; OP: 123.5 barg) and Compression Discharge Cooler QA-E-8001 A (inlet/ outlet OT: 174.5/58 °C; OP: 123 barg)
Intention: Compression and discharge cooling
Drawings: 3538-200-KKD-12212
3538-200-KKD-12213
3538-200-KKD-12214
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
43. Less/ Vacuum Pressure	43.1. Refer To 35.1 (No flow in compressor suction line)	43.1.4. Possibile conditions of vacuum in compressor QA-K-8001A suction header	43.1.4.1. QA-V-8001A is sized for Full Vacuum.		12. Check if piping in compressor suction circuit can handle full vacuum condition.	ENPPI

Session: (5) 24/07/2013
Node: (3A) Compressor Train A QA-K-8001 A (suction/ discharge OT: 174.5 °C; OP: 123.5 barg) and Compression Discharge Cooler QA-E-8001 A (inlet/ outlet OT: 174.5/58 °C; OP: 123 barg)
Intention: Compression and discharge cooling
Drawings: 3538-200-KKD-12212
3538-200-KKD-12213
3538-200-KKD-12214
Parameter: Level

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
44. Higher Level	44.1. Failure closed of LV108	44.1.1. Overfilling of compressor QA-K-8001A casing leading to potential...	44.1.1.1. LZA110 high high level interlock to stop/inhibit starting of the compressor.		13. Add the LZA110 to cause and effect diagram.	ENPPI

Action Items

Session: (5) 24/07/2013
Node: (3A) Compressor Train A QA-K-8001 A (suction/ discharge OT: 174.5 °C; OP: 123.5 barg) and Compression Discharge Cooler QA-E-8001 A (inlet/ outlet OT: 174.5/58 °C; OP: 123 barg)
Intention: Compression and discharge cooling
Drawings: 3538-200-KKD-12212
3538-200-KKD-12213
3538-200-KKD-12214
Parameter: Level

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
44. Higher Level (cont.)	44.1. Failure closed of LV108 (cont.)	...mechanical damage to compressor	44.1.1.1. LZA110 high high level interlock to stop/inhibit starting of the compressor. (cont.)		13. Add the LZA110 to cause and effect diagram. (cont.)	

Action Items

Session: (7) 28/07/2013
Node: (4A) Compressor "A" discharge separator: Compressor Discharge Drum Train A QA-V-8002 A (OT: 58°C; OP:123 barg)
Intention: Condensate separation in compressor discharge
Drawings: 3538-200-KKD-12210
3538-200-KKD-12214
3538-200-KKD-12215
3538-200-KKD-12250
3538-200-KKD-12353
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
53. Misdirected Flow (gas)	53.1. Spurious Opening of BDV101	53.1.1. Unexpected flaring	53.1.1.1. BDV 101 is equipped with limit switch with alarm in DCS 53.1.1.2. BDV 101 is equipped air accumulator to allow three strokes in case of instrument air failure. 53.1.1.3. Incorrect position of BDV-101 activates Compressor QA-K-8001A shutdown.		14. Check with vendor of QA-V-8002A/B/C/D that the equipment internals are designed for the reverse flow in case of depressurization through BDV-101. 15. SOLAR to check partial stroke test of ESDVs during compressor running shall not cause compressor shutdown.	ENPPI SOLAR

Session: (7) 28/07/2013
Node: (4A) Compressor "A" discharge separator: Compressor Discharge Drum Train A QA-V-8002 A (OT: 58°C; OP:123 barg)
Intention: Condensate separation in compressor discharge
Drawings: 3538-200-KKD-12210
3538-200-KKD-12214
3538-200-KKD-12215
3538-200-KKD-12250
3538-200-KKD-12353
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
59. Lower Temperature	59.3. Low ambient temperature.	59.3.2. Possible condensate / hydrates formation in the inlet line of FV-103 (antisurge valve).	59.3.2.1. Inlet line of FV-103 is slopped to QA-V-8002A in order to drain the condensate.		16. Check the availability of proper slope from FV-104 to QA-V-8002A.	ENPPI

Action Items

Session: (7) 28/07/2013
Node: (4A) Compressor "A" discharge separator: Compressor Discharge Drum Train A QA-V-8002 A (OT: 58°C; OP:123 barg)
Intention: Condensate separation in compressor discharge
Drawings: 3538-200-KKD-12210
3538-200-KKD-12214
3538-200-KKD-12215
3538-200-KKD-12250
3538-200-KKD-12353
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
60. Higher Pressure	60.3. Blockage of temporary strainer upstream node FV-103.	60.3.1. Possible incorrect activation of antisurge system.	60.3.1.1. The strainer is installed only during conmissioning (constantly manned operation).		17. SOLAR to confirm if the presence of temporary strainer upstream FV-103 is suitable for the compressor design and if differential pressure signal to control panel is required.	SOLAR

Action Items

Session: (9) 30/07/2013
Node: (2B) Compressor "B" suction including Compressor Suction Drum Train B QA-V-8001 B (OT: 57.2°C; OP: 35.9 barg) when working downstream Train "A"
Intention: Condensate separation
Drawings: 3538-200-KKD-12211
3538-200-KKD-12214
3538-200-KKD-12221
3538-200-KKD-12222
3538-200-KKD-12250
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
69. No/ Less Flow (gas)	69.4. Failure close of PV 223	69.4.1. ~~Same As 69.1.1, 69.1.2, 69.1.3~~	69.4.1.1. ~~Same As 69.1.1.1 & 69.1.2.1~~		18. Verify the possibility to configure PV223 in suction of compressor train B as fail open.	ENNPI/SOLAR
	69.6. Temporary strainer blockage in the suction line of compressor QA-K-8001B	69.6.1. ~~Same As 69.1.1, 69.1.2 , 69.1.3, 69.5.2~~	69.6.1.1. ~~Same As 69.1.1.1, 69.1.2.1~~		19. Provide high alarm on PDIT 208 across temporary strainer	ENPPI

Session: (9) 30/07/2013
Node: (2B) Compressor "B" suction including Compressor Suction Drum Train B QA-V-8001 B (OT: 57.2°C; OP: 35.9 barg) when working downstream Train "A"
Intention: Condensate separation
Drawings: 3538-200-KKD-12211
3538-200-KKD-12214
3538-200-KKD-12221
3538-200-KKD-12222
3538-200-KKD-12250
Parameter: Maintenance

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
85. Others Maintenance	85.1. Periodic gas sampling	85.1.1. The operator needs to reach the new sample connection located downstream QA-V-8001A (Gas Phase)			20. Check sample connection downstream QA-V-8001B to be located in accessble location for operator during 3D model review .	ENPPI
	85.3. Maintenance of LV 202A/B	85.3.1. Needs to operate by-pass line of LV 202A/B			21. Add a note in all applicable P&IDs that the level gauge of all condensate drums shall be visible from manual valve of by-pass line of relevant level control valve installed on liquid discharge line.	ENPPI

Action Items

Session: (9) 30/07/2013
Node: (3B) Compressor Train B QA-K-8001 B (suction/ discharge OT: 174.5 °C; OP: 123.5 barg) and Compression Discharge Cooler QA-E-8001 B (inlet/ outlet OT: 174.5/58 °C; OP: 123 barg) when working downstream Train "A"
Intention: Compression and discharge cooling
Drawings: 3538-200-KKD-12212
3538-200-KKD-12213
3538-200-KKD-12214
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
88. No/ Less Flow	88.3. Failure of speed controller reducing the speed	88.3.1. Increase of pressure in the existing facility.(suction)	88.3.1.1. Low speed alarm SIT-101		22. SOLAR to check the presence of low speed alarm on SIT-201	SOLAR

Session: (9) 30/07/2013
Node: (3B) Compressor Train B QA-K-8001 B (suction/ discharge OT: 174.5 °C; OP: 123.5 barg) and Compression Discharge Cooler QA-E-8001 B (inlet/ outlet OT: 174.5/58 °C; OP: 123 barg) when working downstream Train "A"
Intention: Compression and discharge cooling
Drawings: 3538-200-KKD-12212
3538-200-KKD-12213
3538-200-KKD-12214
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
96. Less/ Vacuum Pressure	96.1. Refer To 88.1 (No flow in compressor suction line)	96.1.4. Possibile conditions of vacuum in compressor QA-K-8001B suction header	96.1.4.1. QA-V-8001B is sized for Full Vacuum.		23. Check if piping in compressor circuit can handle full vacuum condition.	ENPPI

Session: (9) 30/07/2013
Node: (3B) Compressor Train B QA-K-8001 B (suction/ discharge OT: 174.5 °C; OP: 123.5 barg) and Compression Discharge Cooler QA-E-8001 B (inlet/ outlet OT: 174.5/58 °C; OP: 123 barg) when working downstream Train "A"
Intention: Compression and discharge cooling
Drawings: 3538-200-KKD-12212
3538-200-KKD-12213
3538-200-KKD-12214
Parameter: Level

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
97. Higher Level	97.1. Failure closed of LV208	97.1.1. Overfilling of compressor QA-K-8001B casing leading to potential mechanical damage to compressor	97.1.1.1. LZA210 high high level interlock to stop/inhibit starting of the compressor.		24. Add LZA210 to cause and effect diagram.	

Action Items

Session: (3) 21/07/2013
Node: (5B) Condensate system including Condensate Suction Drum QA-V-8005 A (OT: 57.4 °C; OP: 65 -7 barg), Condensate Export Pumps QA-P-8003 A/B/C (discharge OP: 123 barg)
Intention: Condensate storage and distribution
Drawings: 3538-200-KKD-12250
3538-200-KKD-12251
3538-200-KKD-12353
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
137. No/ Less Flow (condensate)	137.6. Spurious closure of XV-027A/B/C in pump discharge line	137.6.1. Same As 137.1.1, 137.3.2			25. Check the possibility of adding the time delay for closure of XV-027A/B/C after pump stop.	ENPPI

Session: (3) 21/07/2013
Node: (5B) Condensate system including Condensate Suction Drum QA-V-8005 A (OT: 57.4 °C; OP: 65 -7 barg), Condensate Export Pumps QA-P-8003 A/B/C (discharge OP: 123 barg)
Intention: Condensate storage and distribution
Drawings: 3538-200-KKD-12250
3538-200-KKD-12251
3538-200-KKD-12353
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
147. Lower Temperature	147.3. Low ambient temperature.	147.3.4. Possible wax formation in standby tank QA-V-8005B.	147.3.4.1. Low temperature alarm on TI-001B		26. Insure that the operating manual of the plant shall include the need for emptying of standby condensate drum to prevent possible wax formation.	ENPPI

Session: (3) 21/07/2013
Node: (5B) Condensate system including Condensate Suction Drum QA-V-8005 A (OT: 57.4 °C; OP: 65 -7 barg), Condensate Export Pumps QA-P-8003 A/B/C (discharge OP: 123 barg)
Intention: Condensate storage and distribution
Drawings: 3538-200-KKD-12250
3538-200-KKD-12251
3538-200-KKD-12353
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
149. Less/ Vacuum Pressure (QA-V-8005A)	149.1. Failure open of PV003A	149.1.1. Unexpected flaring			27. Check adding limit switch (open position) for PV-003A.	ENPPI

Action Items

Session: (3) 21/07/2013
Node: (5B) Condensate system including Condensate Suction Drum QA-V-8005 A (OT: 57.4 °C; OP: 65 -7 barg), Condensate Export Pumps QA-P-8003 A/B/C (discharge OP: 123 barg)
Intention: Condensate storage and distribution
Drawings: 3538-200-KKD-12250
3538-200-KKD-12251
3538-200-KKD-12353
Parameter: Level

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
153. No/ Less Level (interface)	153.1. Failure open of LV-016A	153.1.1. Possbile condensate carry over to the degasser leading to Pressure More in the Degasser and More Flow of gas to cold vent (existing facility)	153.1.1.1. LZA-021A low low level interlock to close ESDV026A in water discharge line 153.1.1.2. PZA-076 (2oo3 redundant logic) high high pressure interlock, in degasser QA-V-4005 inlet line, to close ESDV026A in water discharge line. 153.1.1.3. The vent line of degasser is equipped with flame arrestor		28. Check possibility to configure LV-016A/B as tight shut off.	ENPPI

Action Items

Session: (3) 21/07/2013
Node: (6F) Flash Gas Compressor QA-K-8003 A (OT: 57-68°C; suction/ discharge OP: 31.9 - 35.9 barg)
Intention: Flash gas recompression
Drawings: 3538-200-KKD-12210
3538-200-KKD-12250
3538-200-KKD-12361
3538-200-KKD-12362
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
159. No/ Less Flow	159.1. Spurious closure of ESDV013	159.1.2. Pressure More in QA-V-8005A (#5B)			29. Verify flash gas compressor suction pipe (#80029) & (#80018) is designed for full vacuum.	ENPPI
	159.3. Blockage of strainer in the suction of compressor QA-8003A	159.3.1. ~~Same As 159.1.1, 159.1.2~~			30. Check with the flash gas compressor vendor the need for permanent strainer in the suction line.	KPC

Session: (3) 21/07/2013
Node: (6F) Flash Gas Compressor QA-K-8003 A (OT: 57-68°C; suction/ discharge OP: 31.9 - 35.9 barg)
Intention: Flash gas recompression
Drawings: 3538-200-KKD-12210
3538-200-KKD-12250
3538-200-KKD-12361
3538-200-KKD-12362
Parameter: Composition

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
169. Different Composition	169.1. Level More in QA-V-8005A (#05B)	169.1.1. Overfilling of QA-V-8005A leading to condensate carry-over to compressor QA-K-8003A with possible mechanical damage	169.1.1.1. LZA-002AB high high level interlock to close ESDV011A in inlet line of QA-V-8005A (#05B)		31. Check with flash gas compressor vendor the possibilty to install suction drum for liquid separation.	KPC

Action Items

Session: (3) 21/07/2013
Node: (6F) Flash Gas Compressor QA-K-8003 A (OT: 57-68°C; suction/ discharge OP: 31.9 - 35.9 barg)
Intention: Flash gas recompression
Drawings: 3538-200-KKD-12210
3538-200-KKD-12250
3538-200-KKD-12361
3538-200-KKD-12362
Parameter: Utility

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
173. Failure Utility	173.3. Loss of nitrogen.	173.3.1. Inefficient flash compressor gas sealing.			32. Check with the vendor the need of nitrogen for sealling purposes.	KPC

Action Items

Session: (4) 22/07/2013
Node: (7) Utility air generation and compression including Air Compressor QA-K-8002 A/B/C (OT: °C; suction/discharge OP: barg) and Utility Air Receiver QA-V-8009 (OT:50 C; OP:9 barg)
Intention: Instrument and utility air system
Drawings: 3538-200-KKD-12300-1
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
181. Less/ Vacuum Pressure	181.1. Failure of PIC073 stopping the compressor QA-K-8002A/B/C	181.1.1. Pressure Less in air distribution network (#08) leading to plant shut down	181.1.1.1. PZA-075A low low 1 pressure interlock to close ESDV-038 on header to existing facility. 181.1.1.2. PZA-075B low low 2 pressure interlock to close ESDV-015 on Utility Station. 181.1.1.3. PZA-075C low low 3 pressure interlock to close ESDV-016 on header to nitrogen generation.		33. Provide pressure transmitter with low pressure alarm in air line to utility station, downstream ESDV-015.	ENPPI

Session: (4) 22/07/2013
Node: (7) Utility air generation and compression including Air Compressor QA-K-8002 A/B/C (OT: °C; suction/discharge OP: barg) and Utility Air Receiver QA-V-8009 (OT:50 C; OP:9 barg)
Intention: Instrument and utility air system
Drawings: 3538-200-KKD-12300-1
Parameter: Level

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
182. Higher Level	182.2. Failure of automatic draining device of QA-K-8002A/B/C in closed position.	182.2.1. Possible accumilation of water inside compressor package.			34. Check compressor vendor possible consequence in case of no water draining.	ENPPI

Action Items

Session: (4) 22/07/2013
Node: (7) Utility air generation and compression including Air Compressor QA-K-8002 A/B/C (OT: °C; suction/discharge OP: barg) and Utility Air Receiver QA-V-8009 (OT:50 C; OP:9 barg)
Intention: Instrument and utility air system
Drawings: 3538-200-KKD-12300-1
Parameter: Maintenance

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
186. Others Maintenance	186.1. Failure or air compressor QA-K-8002A/B/C	186.1.1. Need to isolate the air compressor QA-K-8002A/B/C	186.1.1.1. Availability of spare compressor 186.1.1.2. Provision for fork lift entrance inside the compressor building.		35. Check with the compressor vendor the availability of manual valve in discharge line of compressor for isolation purposes.	ENPPI
	186.2. Maintenance on header to utility station.	186.2.1. Need for utility station header isolation.			36. Install a manual valve upstream ESDV-015 for isolation purposes.	
	186.3. Corrosion issues	186.3.1. Contact between QA-V-8009 (carbon steel) and level instrument stand pipe (stainless steel).			37. Check the need for insulation kit between QA-V-8009 and level stand pipe of LT017 and LG018.	ENPPI

Session: (4) 22/07/2013
Node: (7) Utility air generation and compression including Air Compressor QA-K-8002 A/B/C (OT: °C; suction/discharge OP: barg) and Utility Air Receiver QA-V-8009 (OT:50 C; OP:9 barg)
Intention: Instrument and utility air system
Drawings: 3538-200-KKD-12300-1
Parameter: Utility

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
188. Failure Utility	188.1. Loss of electrical power	188.1.2. Stop or air compressor QA-K-8002A/B/C leading to Less Pressure in QA-V-8009	188.1.2.1. QA-V-8009 provides a buffer time of 3 min. Over all buffer time for instrument is equal to 15 min. (provided by QA-V-8010). 188.1.2.2. QA-K-8002C connected to emergency diesel generation.		38. Check the possibility to connect any of compressor QA-K-8002A/B/C to emergency diesel generator.	ENPPI

Action Items

Session: (4) 22/07/2013
Node: (8) Air Dryer Package OA-A-8005 A (OT: °C; OP: barg), instrument air receiver QA-V-8010 and instrument air distribution.
Intention: Instrument air drying and distribution.
Drawings: 3538-200-KKD-12300-1
3538-200-KKD-12300-2
3538-200-KKD-12301-1
3538-200-KKD-12364
3538-200-KKD-12365
Parameter: Utility

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
203. Failure Utility	203.1. Loss of electrical power	203.1.2. Failure or air drying package OA-A-8005A/B leading to increase moisture content in the instrument air distribution network leading to operating/corrosion issues	203.1.2.1. AI001A/B moisture analyzer in OA-A-8005A/B with high moisture content alarm in control room		39. Check the possibilty to connect the OA-A-8005A/B control panel to emergency diesel generator.	ENPPI

Action Items

Session: (7) 28/07/2013
Node: (11) Nitrogen system including Nitrogen Generation Package QA-A-8003 (OT: °C; OP: barg), Nitrogen Compression and Letdown Package QA-A-8004 (OT: °C; OP: barg), Nitrogen Receiver QA-V-8011 (OT: °C; OP: barg)
Intention: Nitrogen generation and distribution
Drawings: 3538-200-KKD-12212
3538-200-KKD-12301-1
3538-200-KKD-12301-2
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
209. Misdirected Flow	209.4. Manual valve in draining line of QA-V-8001 left open due to misoperation.	209.4.1. Release of nitrogen to atmosphere, leading to Less Pressure in QA-V- 8011.	209.4.1.1. Draining operation is constantly manned.		40. Provide a blind down stream manual valve in the draining line of QA-V-8011.	ENPPI

Session: (7) 28/07/2013
Node: (11) Nitrogen system including Nitrogen Generation Package QA-A-8003 (OT: °C; OP: barg), Nitrogen Compression and Letdown Package QA-A-8004 (OT: °C; OP: barg), Nitrogen Receiver QA-V-8011 (OT: °C; OP: barg)
Intention: Nitrogen generation and distribution
Drawings: 3538-200-KKD-12212
3538-200-KKD-12301-1
3538-200-KKD-12301-2
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
210. Higher Temperature	210.1. Failure of TDIC013 putting to maximum power QA-E-8007	210.1.1. Overheating of QA-E-8007 leading to mechanical damage	210.1.1.1. TZA014 high high temperature interlock to shut down electrical heating on QA-E-8007 210.1.1.2. TZA006 high high temperature interlock to shut down electrical heating on QA-E-8007		41. Check the possibilty to relocate TZA-014 down stream QA-E-8007	ENPPI

Action Items

Session: (7) 28/07/2013
Node: (11) Nitrogen system including Nitrogen Generation Package QA-A-8003 (OT: °C; OP: barg), Nitrogen Compression and Letdown Package QA-A-8004 (OT: °C; OP: barg), Nitrogen Receiver QA-V-8011 (OT: °C; OP: barg)
Intention: Nitrogen generation and distribution
Drawings: 3538-200-KKD-12212
3538-200-KKD-12301-1
3538-200-KKD-12301-2
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
212. Higher Pressure	212.2. Failure of PIC086 increasing pressure of QA-A-8004 to QA-E-8007	212.2.1. Possibile overpressurization of QA-E-8007 and compressor QA-K-8001A/B/C seals.			42. Check with vendor of QA-A-8004 the adequate safegaurds to prevent high pressure condition in the nitrogen distribution header.(eg. PSV,High high pressure interlock)	ENPPI

Session: (7) 28/07/2013
Node: (11) Nitrogen system including Nitrogen Generation Package QA-A-8003 (OT: °C; OP: barg), Nitrogen Compression and Letdown Package QA-A-8004 (OT: °C; OP: barg), Nitrogen Receiver QA-V-8011 (OT: °C; OP: barg)
Intention: Nitrogen generation and distribution
Drawings: 3538-200-KKD-12212
3538-200-KKD-12301-1
3538-200-KKD-12301-2
Parameter: Level

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
214. Higher Level	214.1. Delayed draining operation on QA-V-8011	214.1.1. Increase of water level in QA-V-8011 leading to increased moisture content in the nitrogen network to compressors seals and consequent mechanical damage.	214.1.1.1. The nitrogen is produced by dry air; no moisture is expected in QA-V-8011 214.1.1.2. AI002 moisture analyzer inside QA-A-8003 with alarm for high H2O content		43. Check with Nitrogen Generator Package Vendor the Maximum moisture content in the produced nitrogen and evaluate the corrospendent dew point at operating pressure at QA-V-8011	ENPPI
216. Higher Level	216.1. Failure closed of automatic draining system of QA-A-8004	216.1.1. Accumulation of liquid in QA-A-8004			44. Check with QA-A-8004 vendor possible consequence in case of no water draining./Excessive water draining	ENPPI

Action Items

Session: (7) 28/07/2013
Node: (11) Nitrogen system including Nitrogen Generation Package QA-A-8003 (OT: °C; OP: barg), Nitrogen Compression and Letdown Package QA-A-8004 (OT: °C; OP: barg), Nitrogen Receiver QA-V-8011 (OT: °C; OP: barg)
Intention: Nitrogen generation and distribution
Drawings: 3538-200-KKD-12212
3538-200-KKD-12301-1
3538-200-KKD-12301-2
Parameter: Maintenance

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
220. Others Maintenance	220.2. Failure of QA-A-8004	220.2.1. Need to isolate, vent and open the circuit leading to nitrogen production stop.	220.2.1.1. Availability of fixed devices for isoltation, venting and opening		45. Check with QA-A-8004 Package Vendor the availability of a manual valves inside the package for isolation purposes	ENPPI
	220.3. Failure of ESDV 024	220.3.1. Need to isolate the utility station Nitrogen distribution header			46. Provide a manual valve upstream ESDV 024	ENPPI

Action Items

Session: (7) 28/07/2013
Node: (13) HP Fuel gas feed including Flash Gas Preheater QA-E-8002 (OT: 78 °C; OP: 65-34 barg)
Intention: Flash gas feed to fuel gas system
Drawings: 3538-200-KKD-12250
3538-200-KKD-12302
3538-200-KKD-12303-1
Parameter: Maintenance

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
236. Others Maintenance	236.1. Failure of QA-E-8002	236.1.1. Need for isolation, venting, draining and purging	236.1.1.1. Availability of fixed devices for isolation venting & draining. High point vent and low point drains to be provided for line . 236.1.1.2. Provision for utility station for nitrogen purging.		47. Change the position between ESDV-003 & double block bleed manual isolation valves.	ENPPI

Action Items

Session: (7) 28/07/2013
Node: (14) HP Fuel Gas Preheater QA-E-8003A/B (OT: °C; OP: barg)
Intention: Flash gas feed to fuel gas system
Drawings: 3538-200-KKD-12210
3538-200-KKD-12303-1
3538-200-KKD-12303-2
3538-200-KKD-12305
3538-200-KKD-12354
3538-200-KKD-12368
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
246. Higher Pressure	246.3. Failure open of PV043A	246.3.1. More Pressure in QA-V-8006 (#15)	246.3.1.1. PSV097A/B in inlet line of QA-V-8006 size for control failure scenario 246.3.1.2. PZA-044 high high pressure interlock		48. provide the action associated with the PZA -044 high high pressure interlock	Enppi

Session: (7) 28/07/2013
Node: (14) HP Fuel Gas Preheater QA-E-8003A/B (OT: °C; OP: barg)
Intention: Flash gas feed to fuel gas system
Drawings: 3538-200-KKD-12210
3538-200-KKD-12303-1
3538-200-KKD-12303-2
3538-200-KKD-12305
3538-200-KKD-12354
3538-200-KKD-12368
Parameter: Composition

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
250. Different Composition	250.1. Different Composition from existing facility due to presence of condensate (during start-up)	250.1.1. Possible two-phase flow in the line due to condensate carry over leading to possible hammering in the line and inside QAE-8003A/B.	250.1.1.1. the tie-in point with existing pipeline is equipped with 12" condensate trap (minimum1500 mm height) 250.1.1.2. piping is slopped towards pipeline		49. Check with the vendor of fuel gas preheater QA-E-8003A/B that the fuel gas preheater is designed to operate with limited amount of entrained liquid 50. check the need to support 12" condensate trap at fuel gas tie-in point	Enppi Enppi

Action Items

Session: (8) 29/07/2013
Node: (15) HP fuel gas feed including HP Fuel Gas KOD QA-V-8006 (OT: °C, OP: barg), HP fuel gas superheater QA-E-8005A/B (OT: °C, OP: barg) and HP Fuel Gas Filter (OT: °C, OP: barg)
Intention: Condensate separation
Drawings: 3538-200-KKD-12305
3538-200-KKD-12306
3538-200-KKD-12307
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
255. No/ Less Flow (gas)	255.1. No Flow from fuel gas pre-heating circuit (#14)	255.1.4. More Temperature in QA-E-8005A/B	255.1.4.1. FZA-004A to shutdown electrical heater QA-E-8005A/B and shutdown the compressors.		51. Check with SOLAR the possibility to eliminate FZA-004A interlock to stop the compressor and relay on safeguard in turbine skid.	SOLAR
258. Misdirected Flow (gas)	258.3. Spurious opening of BDV006	258.3.1. Unexpected flaring	258.3.1.1. BDV006 equipped with limit switches with alarm in DCS 258.3.1.2. BDV006 equipped air accumulator to allow three strokes in case of instrument air failure.		52. Check the possibility to relocate the BDV-006 downstream QA-S-8001A/B.	ENPPI

Session: (8) 29/07/2013
Node: (15) HP fuel gas feed including HP Fuel Gas KOD QA-V-8006 (OT: °C, OP: barg), HP fuel gas superheater QA-E-8005A/B (OT: °C, OP: barg) and HP Fuel Gas Filter (OT: °C, OP: barg)
Intention: Condensate separation
Drawings: 3538-200-KKD-12305
3538-200-KKD-12306
3538-200-KKD-12307
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
264. Lower Temperature	264.1. Failure of TDIC048A/B shutting down QA-E-8005A/B	264.1.1. Temperature Less in fuel gas to gas turbine with possible condensation and excess of firing with mechanical damage of burners	264.1.1.1. TDZA-034 low low differential temperature interlock to stop the compressor train (ESD level 4). 264.1.1.2. Low temperature...		53. Due to operability issues, check with SOLAR the possibility to eliminate TDZA-034 interlock and relay on low temperature safeguard in turbine skid.	SOLAR

Action Items

Session: (8) 29/07/2013
Node: (15) HP fuel gas feed including HP Fuel Gas KOD QA-V-8006 (OT: °C, OP: barg), HP fuel gas superheater QA-E-8005A/B (OT: °C, OP: barg) and HP Fuel Gas Filter (OT: °C, OP: barg)
Intention: Condensate separation
Drawings: 3538-200-KKD-12305
3538-200-KKD-12306
3538-200-KKD-12307
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
264. Lower Temperature (cont.)	264.1. Failure of TDIC048A/B shutting down QA-E-8005A/B (cont.)	264.1.1. Temperature Less in fuel gas to gas turbine with possible condensation and excess of firing with mechanical damage of burners (cont.)	...alarm on TI-020A		53. Due to operability issues, check with SOLAR the possibility to eliminate TDZA-034 interlock and relay on low temperature safeguard in turbine skid. (cont.)	

Session: (8) 29/07/2013
Node: (15) HP fuel gas feed including HP Fuel Gas KOD QA-V-8006 (OT: °C, OP: barg), HP fuel gas superheater QA-E-8005A/B (OT: °C, OP: barg) and HP Fuel Gas Filter (OT: °C, OP: barg)
Intention: Condensate separation
Drawings: 3538-200-KKD-12305
3538-200-KKD-12306
3538-200-KKD-12307
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
265. Higher Pressure	265.8. Failure open of PV904	265.8.1. More Pressure to existing power generation leading to possible mechanical damage	265.8.1.1. Existing power generation is equipped with high pressure safeguard.		54. Check the possibility to install high high pressure interlock downstream PV-904 in order to close a dedicated ESDV in the line to existing power generation (include the new interlock in the cause & effect diagram).	ENPPI

Action Items

Session: (8) 29/07/2013
Node: (17) LP fuel gas system including LP Fuel Gas Back-up Heater QA-E-8006 (OT: °C, OP: barg), LP Fuel Gas Knock Out Drum QA-V-8007 (OT: °C, OP: barg)
Intention: LP fuel gas feed to KOD
Drawings: 3538-200-KKD-12308-1
3538-200-KKD-12308-2
3538-200-KKD-12354
3538-200-KKD-12368
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
275. No/ Less Flow (gas)	275.4. Manual valve on inlet line of QA-E-8006 left closed due to misoperation	275.4.1. ~~Same As 275.1.1.~~	275.4.1.1. Operating procedures 275.4.1.2. ~~Same As ?, ?~~		55. Configure the manual valves in the tie in point upstream QA-E-8006 from Shams pipeline as locked open. 56. Configure the manual valves across PV-054B as a locked open.	
278. Misdirected Flow (gas)	278.3. Partial leaking of PSV-932A/B	278.3.1. unexpected fuel gas to cold vent	278.3.1.1. Operating and maintenance procedures 278.3.1.2. cold vent is provided with flame arrestor		57. Check if the PSV-932A/B discharge is suitable for existing design of cold vent header including the presence of flame arrestor at the stack	Enppi

Session: (8) 29/07/2013
Node: (17) LP fuel gas system including LP Fuel Gas Back-up Heater QA-E-8006 (OT: °C, OP: barg), LP Fuel Gas Knock Out Drum QA-V-8007 (OT: °C, OP: barg)
Intention: LP fuel gas feed to KOD
Drawings: 3538-200-KKD-12308-1
3538-200-KKD-12308-2
3538-200-KKD-12354
3538-200-KKD-12368
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
284. Lower Temperature	284.1. Failure of TDIC035A/B shutting down QA-E-8006A/B	284.1.1. Temperature Less in fuel gas to QA-V-8007 leading to condesate/hydrate formation	284.1.1.1. QA-V-8007 is sized to separate the condesate. 284.1.1.2. Low temperature alarm on TI-028 from Shams pipeline 284.1.1.3. Low temperature...		58. Relocate the methanol injection point in the common header from Shams pipeline upstream the HP/LP fuel gas branches. 59. Relocate the methanol injection point in the common header from Salam pipeline upstream the HP/LP fuel gas...	ENPPI

Action Items

Session: (8) 29/07/2013
Node: (17) LP fuel gas system including LP Fuel Gas Back-up Heater QA-E-8006 (OT: °C, OP: barg), LP Fuel Gas Knock Out Drum QA-V-8007 (OT: °C, OP: barg)
Intention: LP fuel gas feed to KOD
Drawings: 3538-200-KKD-12308-1
3538-200-KKD-12308-2
3538-200-KKD-12354
3538-200-KKD-12368
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
284. Lower Temperature (cont.)	284.1. Failure of TDIC035A/B shutting down QA-E-8006A/B (cont.)	284.1.1. Temperature Less in fuel gas to QA-V-8007 leading to condesate/hydrate formation (cont.)	...alarm on TI-027 from Salam pipeline		...branches. 60. Install electrical tracing on LP fuel gas backup line from Shams/Salam pipelines including the inlet line to QA-V-8007.	

Session: (8) 29/07/2013
Node: (17) LP fuel gas system including LP Fuel Gas Back-up Heater QA-E-8006 (OT: °C, OP: barg), LP Fuel Gas Knock Out Drum QA-V-8007 (OT: °C, OP: barg)
Intention: LP fuel gas feed to KOD
Drawings: 3538-200-KKD-12308-1
3538-200-KKD-12308-2
3538-200-KKD-12354
3538-200-KKD-12368
Parameter: Composition

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
289. Different Composition	289.1. Different Composition from existing facility due to presence of condensate (during start-up)	289.1.1. Possible two-phase flow in the line due to condensate carry over leading to possible hammering in the line and inside QAE-8006.	289.1.1.1. the tie-in point with existing pipeline is equipped with 12" condensate trap (minimum1500 mm height) 289.1.1.2. piping is slopped towards pipeline		61. Check with the vendor of fuel gas preheater QA-E-8006 that the fuel gas preheater is designed to operate with limited amount of entrained liquid	Enppi

Action Items

Session: (8) 29/07/2013
Node: (17) LP fuel gas system including LP Fuel Gas Back-up Heater QA-E-8006 (OT: °C, OP: barg), LP Fuel Gas Knock Out Drum QA-V-8007 (OT: °C, OP: barg)
Intention: LP fuel gas feed to KOD
Drawings: 3538-200-KKD-12308-1
3538-200-KKD-12308-2
3538-200-KKD-12354
3538-200-KKD-12368
Parameter: Maintenance

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
290. Others Maintenance	290.1. Failure of QA-E-8006	290.1.1. Need for isolation, venting, draining and purging	290.1.1.1. Availability of fixed devices for isolation venting & draining. High point vent and low point drains to be provided for line . 290.1.1.2. Provision for utility station for nitrogen purging.		62. Check to provide bypass line of QA-E-8006 in order to garauntee LP fuel gas supply in case of maintenance of QA-E-8006	Enppi

Session: (8) 29/07/2013
Node: (17) LP fuel gas system including LP Fuel Gas Back-up Heater QA-E-8006 (OT: °C, OP: barg), LP Fuel Gas Knock Out Drum QA-V-8007 (OT: °C, OP: barg)
Intention: LP fuel gas feed to KOD
Drawings: 3538-200-KKD-12308-1
3538-200-KKD-12308-2
3538-200-KKD-12354
3538-200-KKD-12368
Parameter: Other

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
291. Start up/Shut down Other	291.1. PZA-053B opening ESDV-025/040 from existing pipeline	291.1.1. Increase pressure in the line leading to possible vibration			63. Check the suitable action to eliminate the hazard of gas pressurization in the back up fuel gas supply from existing pipeline (flow orifice , piping support, slow opening of ESDV, ..etc)	Enppi

Action Items

Session: (10) 31/07/2013
Node: (19) HP flare header (OT: °C, OP: barg)
Intention: HP flare collection
Drawings: 3538-200-KKD-12309
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
295. More Flow (gas)	295.1. Activation of ESD level 1.	295.1.1. More flow to the existing flare.	295.1.1.1. New flare header, existing flare header and flare are designed for max. flow due to activation of ESD level 1 (total plant depressurization) according to Blow Down Report.		64. As per operation history, dispersion modelling from flare stack in case of total plant depressurization (ESD level 1) considering flare flame out, shall be performed.	ENPPI

Session: (10) 31/07/2013
Node: (19) HP flare header (OT: °C, OP: barg)
Intention: HP flare collection
Drawings: 3538-200-KKD-12309
Parameter: Level

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
307. Higher Level	307.1. Activation of ESD level 1 leading to level increase of existing KO drum	307.1.1. Overfilling of existing KO drum leading to possible excessive flaring	307.1.1.1. LT037/041/344 high high level interlock (2 oo3 voting logic) to activate ESD level 2		65. Verify the existing surge volume in HP KO drum is suitable to accomodate all the condesate produced ESD level 1 (total depressurization).	ENPPI

Action Items

Session: (10) 31/07/2013
Node: (20) LP cold vent (OT: °C, OP: barg)
Intention: LP collection to cold vent
Drawings: 3538-200-KKD-12310
3538-200-KKD-12357
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
313. More Flow (gas)	313.1. Opening of PSV in LP fuel gas circuit.	313.1.1. Flow more for fuel gas through atmosphere.	313.1.1.1. Existing cold vent stack is routed in safe location and provided with flame arrestor.		66. Dispersion from existing cold vent stack due to opening of PSV055A/B in LP fuel gas circuit, shall be included in the next revision of Fire, Gas, Dispersion and Explosion Study. 67. Verify the possibility to route PSV055A/B and PSV932A/B from LP fuel gas circuit to HP flare header. As alternative check the max. pressure drop across the existing flame arrestor in case of opening of PSV055A/B in LP fuel gas circuit and check the possibility to install dedicated backup safeguards for existing flame arrestor (by pass line with rupture disk).	ENPPI ENPPI

Session: (10) 31/07/2013
Node: (20) LP cold vent (OT: °C, OP: barg)
Intention: LP collection to cold vent
Drawings: 3538-200-KKD-12310
3538-200-KKD-12357
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
322. Higher Pressure	322.2. Manual valve on tie in point #22 left closed due to misoperation.	322.2.1. Increase of pressure in cold vent, leading to safe vent impossibility.			68. Configure manual valve on tie in point #22 as locked open.	ENPPI

Action Items

Session: (10) 31/07/2013
Node: (21) Closed drain header (OT: °C, OP: barg) and Closed Drains Drum QA-V-8008 (OT: 45 °C, OP: atmospheric)
Intention: Closed drain collection
Drawings: 3538-200-KKD-12311
3538-200-KKD-12312
3538-200-KKD-12372
3538-200-KKD-12373
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
334. No/ Less Flow (condensate)	334.4. Failure of PIC063 stopping QA-P-8007A/B	334.4.2. more pressure in discharge line of QA-P-8006A/B	334.4.2.1. QA-P-8006A/B is equipped with minimum flow line 334.4.2.2. design pressure of QA-P-8007A/B is equal to 5.5 barg below designpressure of piping		69. Check with vendor QA-P-8006 the requirement of min. flow line.	ENPPI
	334.7. Spurious closure of XV-031A/B in pump discharge line	334.7.1. ~~Same As 334.1.1, 334.5.2~~	334.7.1.1. ~~Same As 334.5.2.1, 334.5.2.2, 334.5.2.3, 334.5.2.4~~		70. Check the possibility of adding the time delay for closure of XV-031A/B after pump stop.	ENPPI

Session: (10) 31/07/2013
Node: (21) Closed drain header (OT: °C, OP: barg) and Closed Drains Drum QA-V-8008 (OT: 45 °C, OP: atmospheric)
Intention: Closed drain collection
Drawings: 3538-200-KKD-12311
3538-200-KKD-12312
3538-200-KKD-12372
3538-200-KKD-12373
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
340. Higher Pressure	340.3. Gas blow by from compressor casing.	340.3.1. Increase of gas release to cold vent and to atmosphere.	340.3.1.1. Low level interlock to stop compressor draining from casing. 340.3.1.2. Maximum reachable pressure in QA-V-8008 in case of gas blow by from compressor casing is below...		71. Check that the cold vent design is suitable to accomodate the maximum gas flow rate due to failure of LV006 in open position (from QA-V-8006). 72. Check that the cold vent design is suitable to accomodate the maximum gas flow rate due to failure of LV009 in...	Enppi

Action Items

Session: (10) 31/07/2013
Node: (21) Closed drain header (OT: °C, OP: barg) and Closed Drains Drum QA-V-8008 (OT: 45 °C, OP: atmospheric)
Intention: Closed drain collection
Drawings: 3538-200-KKD-12311
3538-200-KKD-12312
3538-200-KKD-12372
3538-200-KKD-12373
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
340. Higher Pressure (cont.)	340.3. Gas blow by from compressor casing. (cont.)	340.3.1. Increase of gas release to cold vent and to atmosphere. (cont.)	...design pressure.		...open position (from QA-V-8007).	
	340.5. External fire	340.5.1. Same As 340.4.1	340.5.1.1. Open line to cold vent		73. Check if the cold vent line is suitable to release over pressure due to fire.	ENPPI

Action Items

Session: (10) 31/07/2013
Node: (23) Emergency diesel generator QA-G-8002 Closed (OT: °C, OP: barg)
Intention: Emergency power supply
Drawings: 3538-200-KKD-12314
3538-200-KKD-12371
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
355. Higher Pressure	355.1. Refer To 349.2 (Manual valve on inlet line of QA-G-8002 left closed due to misoperation)	355.1.1. Increase of pressure in the line after diesel pump shutoff pressure.			74. Verify that design pressure of new diesel supply line to QA-G-8002 is suitable for design pressure of existing diesel pump.	ENPPI

Session: (10) 31/07/2013
Node: (23) Emergency diesel generator QA-G-8002 Closed (OT: °C, OP: barg)
Intention: Emergency power supply
Drawings: 3538-200-KKD-12314
3538-200-KKD-12371
Parameter: Utility

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
362. Failure Utility	362.1. Loss of electrical power.	362.1.1. Loss of heat tracing, leading to diesel freezing in winter.			75. Check if indication of state (on/off) of electrical tracing is provided.	ENPPI

Action Items

Session: (6) 25/07/2013
Node: (25) Turbine Fuel Gas system (OT=90°C , OP=34 barg) Intention: Provide fuel gas to turbine
Drawings: 3P991-149446-5
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
377. No/ Less Flow	377.6. Spurious closure of FCE2140	377.6.1. No Flow of fuel gas to pilot leading to pilot flame out.	377.6.1.1. FCE2140 is equipped with position indicator with interlock to stop the turbine.		76. SOLAR to update P&ID to include all safeguards mentioned in present HAZOP study.	SOLAR

Session: (6) 25/07/2013
Node: (25) Turbine Fuel Gas system (OT=90°C , OP=34 barg) Intention: Provide fuel gas to turbine
Drawings: 3P991-149446-5
Parameter: Pressure

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
383. Higher Pressure	383.4. ~~Refer To 377.2, 377.3, 377.4, 377.5~~ (No flow of fuel gas)	383.4.1. Over pressurization of fuel gas circuit.	383.4.1.1. PSV-2100 in the inlet of fuel gas line to protect mechanical integrity of the fuel gas circuit.		77. SOLAR to provide design case and set point of PSV-2100 according to design pressure. 78. SOLAR to check the possibilty of raising the rating of the fuel gas system to be consistant with upstream feed circuit (600 psi rating) . As alternative, SOLAR to provide additional on/off valve in the inlet of fuel gas circuit (upstream F2100) to be closed by PT2120 high high pressure interlock	SOLAR SOLAR

Session: (6) 25/07/2013
Node: (25) Turbine Fuel Gas system (OT=90°C , OP=34 barg) Intention: Provide fuel gas to turbine
Drawings: 3P991-149446-5
Parameter: Other

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
389. Other	389.2. Presence of condensate in the gas fuel torch line during start up.	389.2.1. ~~Same As 389.1.1~~	389.2.1.1. ~~Same As 389.1.1.1~~		79. SOLAR to check the possibility to drain the fuel gas torch line before start up in case of presence of condensate in the line.	SOLAR

Action Items

Session: (9) 30/07/2013
Node: (27) Compressor dry gas seal system
Intention: Provide fuel gas to turbine
Drawings: 3P991-149446-6
3P991-149446-7
Parameter: Flow

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
405. No/ Less Flow (seal gas)	405.2. Spurious closure of AV5120	405.2.1. ~~Same As 405.1.1~~			80. Check the fail/safe position of AV-5120 and PCV-5150 (seal gas), AV-5110 and PCV-5110 (nitrogen), PCV-5100 (instrument air).	SOLAR

Session: (9) 30/07/2013
Node: (27) Compressor dry gas seal system
Intention: Provide fuel gas to turbine
Drawings: 3P991-149446-6
3P991-149446-7
Parameter: Temperature

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
418. Lower Temperature	418.1. Less Temperature from seal gas inlet line	418.1.1. Possible condensate formation in the seal gas line leading to possible mechanical damage of mechanical seal.	418.1.1.1. Conditionning skid upstream seal gas inlet line.		81. Check with SOLAR the possibility to provide a low temperature alarm/safeguard in the seal gas treatment skid.	SOLAR
	418.2. Less Temperature from nitrogen inlet line	418.2.1. Possible condensate formation in the nitrogen line leading to possible mechanical damage of mechanical seal.			82. Check with SOLAR the minimum design temperature for secondary dry gas seal system is consistant with min. design temperature of nitrogen supply circuit (-25°C).	SOLAR
					83. Check with SOLAR the possibility to provide a low temperature alarm/safeguard in case of failure of QA-E-8007 nitrogen heater.	SOLAR

Action Items

Session: (9) 30/07/2013
Node: (27) Compressor dry gas seal system
Intention: Provide fuel gas to turbine
Drawings: 3P991-149446-6
3P991-149446-7
Parameter: Level

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
422. Higher Level	422.1. Delayed draining operation on T9500 due to misoperation. 422.2. Manual valve on draining line of K09500 to T9500 left closed due to misoperation	422.1.1. Possible condensate flow to dry gas seal system leading to damage. 422.2.1. ~~Same As 422.1.1~~	422.1.1.1. High high level alarm in LI9500.		84. Check if LI9500 is provided with interlock to stop the turbine. 85. Check to configure the manual valve on drain line of K09500 to T9500 as Locked Open	SOLAR SOLAR

Session: (9) 30/07/2013
Node: (27) Compressor dry gas seal system
Intention: Provide fuel gas to turbine
Drawings: 3P991-149446-6
3P991-149446-7
Parameter: Maintenance

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
424. Others Maintenance	424.1. Plugging of F9501/F9502	424.1.1. Need for isolation venting , draining and purging of the F9501/F9501	424.1.1.1. Availability of spare filter. 424.1.1.2. Provision for utility station for nitrogen purging.		86. Check the possibility to install additional manual valve on drain line of F9501/9502 for isolation purposes in consideration of high differential pressure in case of maintenance. 87. Check the possibility to configure the manual valve in the inlet line of the seal gas treatment skid as locked open,	SOLAR SOLAR

Action Items

Session: (9) 30/07/2013
Node: (27) Compressor dry gas seal system
Intention: Provide fuel gas to turbine
Drawings: 3P991-149446-6
3P991-149446-7
Parameter: Other

DEVIATION	CAUSES	CONSEQUENCES	SAFEGUARDS	REF	RECOMMENDATIONS	BY
425. Start up/Shut down Other	425.1. Settling out pressure during pressurized shut down	425.1.1. Need for activation of seal gas boost system.			88. Check seal gas boost system can be used during pressurized shut down (settling out pressure = 100 barg)	SOLAR

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